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Ministry of
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Services

THE WORKING ENVIRONMENT AND ITS EFFECT ON PRODUCTIVITY

A DISCUSSION PAPER

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PREFACE

The concept of "the working environment" is central to this ministry's responsibilities for providing accommodation and managing facilities on behalf of the Government of Ontario. This past year we stepped up our activity on the topic in Planning Branch by undertaking research projects and later, preparing a presentation for the Deputy Minister to give to a federal-provincial conference in August at St. Andrews, New Brunswick. The result of these activities is this discussion paper.

Many individuals within the Ministry contributed information and ideas; the perspective widened as it became clear that productivity in the workplace was the product of the interaction among -- and the integration of -- three major elements: the physical environment, or facilities; technology -- especially automated office equipment; and people -- the individuals not only, but also the organizational structures and attitudes surrounding them.

Although Government Services is actively investigating the state of the art in integrated workplaces and the evidence is mounting on the benefits of this approach, we still have much to learn. We are convinced, however, that it is an essential direction to guide the delivery of all our services.

Readers' suggestions and comments are welcome and should be addressed to:

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I. INTRODUCTION

This discussion paper has four main objectives:

- to illustrate the breadth and complexity of the working environment
- to discuss its significance for productivity
- to review the tangible implications for providers of government services, including architects, engineers, builders, systems specialists, suppliers of goods and services, and managers
- to consider the benefits of information-sharing on this topic.

Dimensions of the Working Environment

In the broadest sense, the working environment includes all the tangible and intangible structures, objects and processes surrounding any individual throughout the working day. The productivity of the individual at work is affected directly by the success with which the working environment supports the functional requirements of the job and satisfies the perceived and real needs of the individual.

Although the working environment, thus defined, is much more than the sum of the physical conditions in which the employee functions, these conditions are nevertheless critically important. They include space allocations, characteristics of the building, the furniture and furnishings and the technical tools.

Recently, for example, there has been increasing attention paid to the health and safety aspects of the working environment. Specifically, attention has been focused on air quality and the potential impact chemical contaminants and pollutants may have on the health and therefore productivity of workers within buildings. A recent consulting study prepared for the Ministry of Government Services mentioned that "one professor of mechanical engineering announced happily at a recent forum of the American Society of Heating, Refrigerating and Air Conditioning Engineers that the list of suspect air-borne contaminants now numbers over 3,000 -- analytical work for all scientists for the next 25 years".

Often, there are gaps between the service provided to client tenants (even when it is good, rapid service) and what the people who work in a building need and want. In one recent instance, the Ministry of Government Services attempted to meet client needs by making a special effort to rush the accommodation preparation. We were moving one of our ministries into a different location and, in consultation with them - and respecting the corporate interests that as little staff time as possible be lost in the process - we managed to have all the carpets laid over the week-end so that people could start work on Monday morning. The result was a significant number of complaints during the first week of occupancy about strong, unpleasant fumes emanating from the new carpets. There had not been time for them to air out. The question then, is, how best to deal with these issues in the future: can the airing-out process be speeded up? should we build more time into the process? are odorless carpet fibres available?

In another example, a new building was designed to provide open landscaping for individual areas of work, with a few shared or common meeting rooms provided for each floor. Before long, however, a few work units had established territorial control over the meeting rooms; the good design and intentions did not quite mesh with the employees' perceived needs.

As well, the presence of computer technology is demanding more and more integrated service from providers of facilities: a requisition for a new micro computer also implies the provision of such things as appropriate furniture, new lighting, increased ventilation, additional electrical power, and a new telephone line.

Increasingly, all large organizations are experiencing labour relations pressures to recognize the interrelated aspects of the working environment. We see this in the negotiation process on health and safety issues and when we talk about benefit packages.

These are not isolated or uncommon examples, either for us in Ontario or, from what we have been hearing, for others in our business, whether in government or in private enterprise; once an organization has reached a certain size these issues appear.

This has led us to think in somewhat broader terms about the business we're in than we have traditionally done.

Pressure to Increase Productivity

In addition to the issue of the appropriateness of the workplace from the user's point of view, there is the growing need, on behalf of the taxpayers, to ensure the highest possible level of productivity from government employees. Central agencies as well as line ministries are examining ways to achieve higher productivity.

As individual managers we all are concerned about doing more with less -- with somehow gaining greater leverage from our resources. In this search for increased productivity we may look down several avenues:

- organizational structures that are flatter and more responsive
- management styles that boost morale and personal commitment
- technology that puts repetitive work into machine form
- facilities that allow efficient work flow patterns.

As suppliers of the physical components of the working environment, our contribution to this concerted effort to boost productivity seems to us to be to study and learn how the facilities and furnishings influence the productivity of the people, and to apply that knowledge across the full range of our activities. It is possible that we are missing the potential synergy that may come from integrating all these productivity initiatives. As the ministry that supplies the support services for the rest of government, we may be able to offer our clients even greater benefits if we deliver our services in a responsive and coordinated fashion.

The Business Case for Investing in the Working Environment

The Province of Ontario has a staff complement of approximately 78,000 positions. These workers occupy a total of more than 4.5 million square metres within buildings owned and leased by the province. Although the costs to create, maintain and repair these buildings are substantial, approximately $440 million per year, they are small compared to total salary costs, approximately $2.2 billion per year.

Several studies have verified that over the functional life-span of a typical office building, the personnel costs amount to 10-15 times the total facility costs. Therefore, it can be appreciated that an attempt to constrain facility expenses to levels where worker productivity is negatively affected, is a false economy. It must be recognized that facility expenses are an essential contributor to worker productivity.

II. THE CONTEXT

When we talk about the working environment to people who are not in the business of providing accommodation, we anticipate a discussion about ergonomics and they start talking instead about issues of human resource management, the organization plan, the rate of change (especially technological change), the nature of bureaucracies, and the differences and similarities between government and the private sector. One's definition of the working environment is framed to a large extent by one's area of endeavour.

Thus, in its broadest sense, the working environment may be roughly translated as the corporate culture -- in other words, "the way we do things around here".

The Culture of the Working Environment

1. The Public Sector Environment

The environment in which people work in the public sector -- in government -- is seen and felt to be different from business or industry. Often, the climate is defensive: public servants are often criticized and not so often defended. The public service environment, ideally, should appear efficient but not expensive.

People who work in the public sector function in a setting where political realities dictate a short planning timeframe with shifting, sometimes conflicting, objectives. The government organizations are big. Relatively speaking, this is true even in smaller jurisdictions.

2. Human Resource Management

The culture of the organization is strongly affected by management style. For most organizations, it appears, certainly for government, there are many styles that impede creativity. At work people function within the limits of a well-defined hierarchy.

Human resource management is too often characterized by a we/they mentality: management and the employer on one side, and everyone else on the other, with relationships negotiated through the collective bargaining process.

An Atmosphere of Change/Uncertainty

A galloping rate of change permeates not only the government workplace, but the larger society generally. Throughout our organizations we can see efforts to manage change and to accept it into our daily activities. Often these initiatives are made to improve aspects of the working environment. Experiments are underway with a more open and relaxed managerial style, flatter organizations, and with task groups organized around specific requirements as they emerge.

A management consultant was quoted recently to the effect that not only are traditional product boundaries breaking down, but so are the boundaries between corporations, with telephone companies moving into computers, computer companies into communications, and robot companies beginning to make vehicles. "Reality is being fractured and reassembled", he said; "what used to be is not so much altered as it is replaced."*

According to him, traditional management styles are also obsolete; the corporation must be transformed and revitalized through the adoption of new values and beliefs, new management style, and a new corporate culture. The public sector cannot afford to lag behind.

It has been suggested that the implications for planning should be to expect change, to incorporate the idea of change into all our plans, so that we don't build things to remain static, but to be flexible and adaptable, whether these things are intangible working organization plans or floor plans. Once we've stopped resisting change so much, we can also look at the way we allocate space. Since, in government, the size of the profit does not influence the size of our offices, we've created rug-ranking rules. It may be time to dispense with these hierarchical rules in favour of other determining criteria, such as occupational requirements, comfort needs and personal work styles. But it's unlikely we will ever have enough windows to satisfy everybody!

Change and uncertainty may be elixirs to spur creativity in some people, but the anticipation of change creates anxiety, fear and resistance in many. The introduction of change is a process that requires careful management attention.

As Abraham Lincoln is reputed to have said, "The best thing about the future is that it comes only one day at a time."

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* F.D. Barrett of Management Concepts Ltd., Toronto, as quoted by Ronald Anderson in the Globe and Mail, August 8, 1985.

Integration and Relationships: Technology and the Working Environment

Speaking of change, technology, as we all know, has led the way. The computer may be to organizations what the steam engine was to industry. Now that it is so large a part of the working environment, it is a major influence on how people function and behave day by day. Introduced initially to obtain productivity gains, computer technology has been found to have additional benefits, offering new ways of doing things that could not have been imagined not so long ago. It has become a major investment in the working environment, and buildings as well as people have had to adapt.

One of the imminent applications for Government Services is the integration of voice and data communications, with implications for extensive rewiring of existing buildings as well as for the way we do business with our clients.

As a concept, the working environment is not easy to put boundaries around. As well as the tangible and intangible components we have been discussing, it also includes labour, health and safety legislation and relationships to other government agencies with responsibilities for such things as the building code, fire code and labour regulations, energy conservation and air quality.

Productivity

The notion of productivity has become a focal issue in the workplace for government as well as for business and industry; as such, it is an intangible component of the working environment. The implications seem to be for more and better measurement and for carrying out pilots and prototypes to guide subsequent capital investment. Throughout this process we must be prepared to accept and learn from our failures and to walk away from such experiments -- not to try to patch them up.

We may also think about what we are providing to our clients in a somewhat different way. Our clients come to us for assistance to satisfy their needs. In marketing language, we should look at the results of our efforts as benefits which flow to our clients. With this orientation we may appreciate the impact and synergy that may derive to government as a whole when we focus on productivity improvement and package our services into an integrated approach.

III. DEFINITION OF THE WORKING ENVIRONMENT: THE ONTARIO GOVERNMENT PERSPECTIVE

In the broadest sense, the working environment includes all the physical and non-physical structures, objects and processes surrounding any individual throughout the working day. It has been suggested that the driving force for the working environment derives from the organizational structure and procedures which define people's tasks, responsibilities and authorities.

The physical environment (facilities), which comprises all the tangible objects in the workplace, exists solely to support the individual in carrying out the assigned tasks. Finally, increasing attention is being paid to technology in the workplace. This term is used to describe mechanical, electrical and electronic office equipment provided to assist the individual in his or her work.

Overriding these three major components of the working environment - organization/facilities/technology - are the psychological and sociological aspects of individuals working alone or in groups.

From this perspective, the working environment is defined by a complex set of variables and interrelationships generated through the interaction of these three main components. A diagrammatic model illustrates the potential for interaction (see page 8). The overlapping areas show the interfaces among these three components and the critical areas where competing requirements may cause conflict.

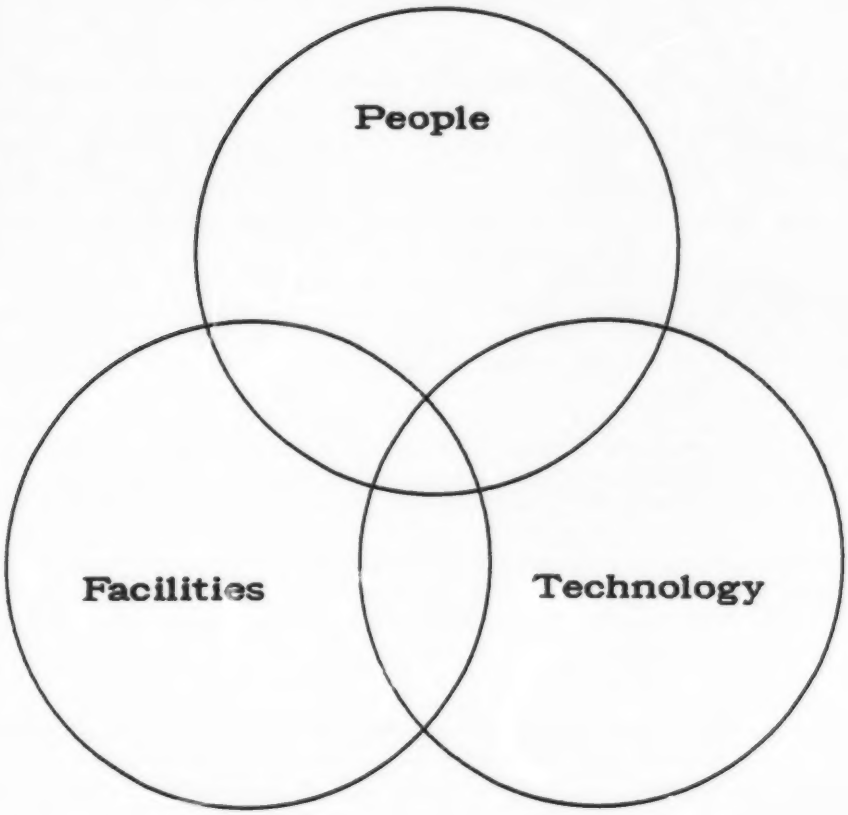
The Working Environment and Productivity

The focus of the working environment is the individual carrying out assigned tasks and duties. Therefore, the working environment exists to foster and support the productivity of the person at work. In this regard the term "ergonomics" is being used to describe the issue of productivity and the relationship of the individual with the working environment. The Concise Oxford Dictionary defines ergonomics as:

> "the study of efficiency of persons in the working environment."

Several independent studies have shown a complex but direct relationship between the productivity of the individual and the success of the working environment in satisfying actual and perceived needs. Similar studies have shown that the facilities aspects represent approximately 8 to 12 percent of the total cost of the operation. The major and most significant cost comes from employee salaries and related benefits. Productivity improvement must focus on occupant or user needs in the broadest sense, not just on the latest building and equipment technology.

THE WORKING ENVIRONMENT



To express these issues in another way it is of value to note that in the Ontario Government the following statistics* apply:

. Total space inventory owned	3,710,000m^2
. Total cost to maintain	$280 million annually
. Total space inventory leased	815,000m^2
. Total cost to landlord	$90 million annually
. Number of staff accommodated	78,000
. Total payroll cost	$2.214 billion annually
. Current absenteeism rate	10 days per employee per year
. Payroll cost of absenteeism	$70 million annually

* Not including new construction costs.

Therefore, the working environment is a crucial and important issue for consideration and study within our ministry. We recognize that the responsibility for the provision of the physical components ultimately affects the productivity of those delivering government programs. All facility design, development and operations staff must be trained to be more sensitive to user needs in the working environment and to provide services to support general productivity.

IV. FACETS OF THE WORKING ENVIRONMENT

For the purposes of this paper, facilities include all major physical components such as the land, buildings, structures, utilities, partitions, finishes, and furnishings. The term excludes complex machinery and small office equipment and supplies.

Ontario Government Services' role as provider of the physical environment takes in all of the major components - and more. As service providers, we are increasingly aware that the facilities we build and manage exist to serve the people who live and work inside them. Our buildings enclose and enhance the activities of people delivering practically every service offered by the Government of Ontario.

Practically every aspect in the decision-making process to provide a facility can have some impact on the productivity of the people who will occupy that facility. The following items and comments are not an exhaustive list but do demonstrate the diversity and scope of the issues surrounding the various facets of the working environment.

- **Location** - The relocation of office functions out of downtown areas presents an opportunity to reduce facility costs and to place the office closer to where the people live. However, suburban and small town locations may not offer the ancillary amenities available in urban centres and may complicate communication with parent organizations.

  The current belief is that it is unlikely that large numbers of government employees will be working out of their homes. In some respects, however, non-traditional offices have existed in government for many years. Government field auditors, property assessors, survey crews and various groups of mobile government personnel make their offices in trains, boats, planes, trailers, snowmobiles or anyplace their work takes them. Cellular technology might eventually make it convenient for field staff to access computer networks via portable wireless terminals. But for most of the labour force, it is anticipated they will continue to go to the office, rather than have the office come to them.

- **Access** - Convenient access by public transit or by car (with parking) often is a necessity for attracting and retaining good staff as well as for providing effective customer service.

- **Massing** - Highrise office blocks may reflect land values and offer prestige and view, but small floor plates can restrict the flexibility of interior layouts and the utilization of space, as well as increase staff time spent in elevators. Large floor plates, however, can leave some work stations far from natural light and outside view.

- **Floor plate** - The efficacy with which a floor plan can be laid out in a building depends on the configuration of the floor, including the dimensions between structural elements. Similarly, the positioning and design of the vertical elements and support areas can affect the overall efficiency and utilization of individual floors.

- **Energy Conservation** - The selection of materials to enclose a building and the systems to light, heat and cool the interior spaces must be made carefully to ensure that sufficient flexibility and capacity exists to accommodate the varying needs of the occupants who must work in the building.

- **Ergonomics** - (from the Greek ergon, meaning work, and the English word economics) is the study of people in relation to their work. The modern science was born in Britain during World War II. The focus was military and was in response to solving problems pilots encountered operating a variety of complex instruments in the confined cockpits of their aircraft.

  Human factors engineering (another definition of ergonomics) is multi-disciplined, involving the talents of engineers, architects, physiologists, behavioral scientists and designers. The capacities and limitations of human beings are taken into account in the design of tools, tasks, work spaces and environments. The goal of ergonomics is to strike an optimum balance among employee productivity, comfort, safety and well-being.

  Since workplace, tools and the effectiveness of people are interrelated, changes in one area can disrupt the harmony of the whole system. Furniture manufacturers have done a tremendous marketing job in producing and selling their "ergonomically" designed products. Furniture is, however, only a small component of ergonomic design. We should concern ourselves with all facets of the working environment to reflect the full scope of ergonomics (eg. the design of work, and the quality of working life; organizational and human resource planning; air quality and improved standards for the macro physical environment; training, management styles; and more).

- **Air Quality** - The introduction of synthetic materials and a wide range of chemicals into the working environment is causing concern for the potential health problems they may cause. Recently, TBS (Tight Building Syndrome) has been highlighted as energy conservation measures have reduced fresh air intake levels. While CO_2 and organic vapours from new synthetic fabrics are known contaminants little research has been done to quantify other potential hazards. For example, the increase in the use of plants has introduced toxic sprays. Tight buildings may not permit exhaust or dilution of contaminants. The quality of the air is also compromised by the presence of tobacco smoke which creates on-the-job health and morale problems for a sizeable number of non-smokers.

- **Interior Layout** - Cellular offices and open landscapes both require careful planning to ensure that individuals are located so that they can perform their tasks and so that organizational and workflow patterns can be enhanced. Layout design also impacts directly on the basic psychological needs for privacy, territoriality, status and personalization within the work place.

- **Layout Flexibility** - As organizations change it is inevitable that the layout must respond in order to retain operational relationships and productive workplaces. Flexibility derived from modular work stations or demountable partitions can be built into the layout to minimize the disruption that subsequent alterations will cause. But people have often resisted changes of this kind, perceiving a loss of status and privacy.

- **Furniture** - Modular furniture which can be changed easily adds flexibility. Modular work stations can be assembled from basic components to suit individual worker needs and to incorporate modern office technology. Inappropriate or poorly designed workstations and seating can cause discomfort, distraction and health problems (eg. backache) which result ultimately in reduced productivity. Significant investments in electronic office equipment often are not supported by appropriate expenditures in suitable furniture.

- **Decoration** - Colour, texture and design can be used to define and create visual conditions to support various types of activities, eg. cool colours for rest areas.

- **Utilities** - Building systems (heating/ventilation/cooling/electrical/lighting/telecommunications) must be designed with sufficient flexibility and capacity to suit the various and changing requirements of the occupants within a building. The increasing introduction of electronic equipment places special and sometimes critical demands on these systems. For example, lighting systems must be designed to provide well-placed, properly coloured illumination of the correct intensity without glare. Inadequate or inappropriate lighting can cause discomfort, eye strain, worker complaints and ultimately productivity losses.

- **Acoustics** - Achieving proper sound control in the office environment, whether for private offices or open plan, is important to meet the functional requirements for confidentiality, speech privacy and employee concentration.

  Distracting sounds can be produced from a variety of sources such as office equipment, telephones and normal conversations. Depending on their intensity and duration, they can, and often do, affect the mental attitude of those who hear the noise.

  Sound absorptive materials used on ceilings, floors and walls as well as the strategic use of sound absorbing acoustical panels will help to attenuate annoying sounds. On the other hand if the office becomes too quiet conversations between offices can easily be overheard. Too quiet an environment can be as distracting and non-productive as a noisy one.

  The objective should be to achieve a constant, dependable ambient sound level which can be tolerated and will allow worker concentration thereby making the environment conducive to work. This is usually achieved by adding electronically generated sound as background noise, commonly called "sound masking" or "white sound", which suitably increases the ambient sound level.

- **Space Standards** - The amount of space allocated to a worker should reflect the operational requirements of the tasks being performed. Fixed standards for space and furniture based on organizational hierarchy and status no longer satisfy evolving needs. New requirements are emerging as a result of the new technology, eg. to accommodate electronic equipment in the workplace, for rest areas for VDT operators; and for storage for equipment manuals and materials. Other factors affecting space configurations are the

views of the employees - who are becoming more vocal, the need to conserve energy, and the growing expertise of facilities' managers and planners.

- **Telecommunications** - Increasing consideration is being given to the integration of voice and data networks through the use of enhanced telephone systems and the interconnection of stand-alone computers and terminals. These new systems result in new requirements for cable management within individual workstations and throughout entire buildings, eg. fibre optics. Also this integration may have organizational implications within our client groups; do we deal with the telephone coordinator on the EDP systems person?

- **Rate of Change** - Technology is developing rapidly. Therefore, equipment and facility requirements are changing quickly, particularly in the areas of information processing and communication. The rate of this change places increasing demands on the capability of the physical layout and the utility systems to adapt to new requirements.

- **Organizational Style** - The culture of an organization often finds expression in the physical form. The physical environment can reflect the attention given to hierarchy (eg. cellular offices, furniture, finishes) or to style (eg. openness, colour, traffic patterns).

- **Nature of Work** - Technology has a direct impact on how tasks are defined and organized. John Diebold has written: "The design of office chairs, the angle of video display terminals, the sculpture of keyboards, and the intensity of lighting may soon be obsolete concerns. What if the worker of tomorrow no longer interacts with the computer via a keyboard, but instead issues commands by voice, by touch, or even by simply thinking? What if the worker is no longer tied to a workstation, but is instead entirely mobile - working with a portable computer in a variety of locations, including the home? What if the office of the future is not an office at all?

  The key ergonomic challenge of the decades ahead will concern work patterns and relationships, information flows, and the changing nature of work itself."*

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* John Diebold, "Technology's Touch: Automation can humanize work", Management World, February 1985; Vol. 14, No. 2.

It should be recognized that buildings have an initial functional life span of 20-25 years for the essential utility systems and a life span of 50 or more years for the basic structural elements. It is important to realize that these buildings will have to accommodate office functions which we cannot envision today.

- **Worker Organizations (Unions)** - These groups have identified the interrelated components of the working environment and now utilize these issues and technologies in negotiating both health and safety issues as well as benefit packages. This factor as well as the technical issues, make the study of the working environment a pressing employer and management need.

V. CONCLUSION

Implications for Suppliers of Facilities

In Ontario, the Ministry of Government Services has experienced and continues to receive considerable pressure to constrain its expenditures on capital and operating costs for providing and maintaining working environments (accommodation) for programs and employees. As the relationship between environment and productivity becomes more fully understood and accepted, the methodology for achieving greater productivity and constraint must broaden and change.

With continuing fiscal constraint productivity becomes a central issue. The accelerating introduction of office automation technology demonstrates the desire to achieve higher production levels with equal or reduced labour. However, the full capacity of these new technologies may never be realized if similar investments are not made in proper furniture, lighting, acoustic control and ventilation systems. Although increased productivity in the workplace is a necessary objective, the measurement of improvements gained through the introduction of new technology remains a difficult task. Government policy and strategic priorities must be clarified with respect to recognizing facility expenses as a contributor to productivity and in setting appropriate funding levels for the provision of productive working environments. Also, some understanding must be developed for the work style changes anticipated over the next 20 years and long term information and productivity strategies arrived at. Without this we have no basis for planning infrastructure changes.

With the current emphasis on fiscal constraint, productivity improvement and labour relations issues related to air quality and the quality of working life, the integration and coordination of the wide range of services provided by our Ministry become increasingly important. Our computer and telecommunication equipment and systems, the provision and maintenance of buildings, and the counselling and health care of employees are services with strong interrelationships to each other, to the working environment, and ultimately to productivity.

Beyond our ministry are several more ministries with direct program responsibilities for other aspects of this issue. These include occupational health and safety regulations, public health, smoking in the workplace, daycare, building and fire codes, physical recreation and fitness, human resource policies, collective agreements, energy conservation and air quality.

Moreover, a coordinated effort among the federal and provincial governments can help to ensure that all relevant aspects of the study of the working environment are considered in a comprehensive way without unnecessary duplication of effort.

Current Activity

In recognition of the need for communication about the working environment, and to collect and synthesize the information available from all related sources, we have established a new position to carry out this communications function. Our intention is to be able to bring the wider understanding of the working environment to bear on our job of providing productive facilities to our client ministries.

There are also a number of specific studies and analyses that have been recently carried out, ranging from "A Study of Management and Accountability in the Government of Ontario" to "A Report on Air Quality by the Ministry of Government Services". We're studying the way we provide service to our clients and the ergonomics of operating video display teminals, and we're putting together a directory of Design and Facility Management Practices in Ontario Government Buildings.

The data collection and analysis are ongoing - pilot projects and application to construction and renovation activities would be logical next steps. We welcome comments, suggestions and any information on relevant activities which you wish to share.

MGS Planning Branch
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